

THE DETERMINANTS OF OFFICE LOCATION
IN THE NEW YORK METROPOLITAN REGION

by

James Murphy
B.A. Yale University
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Submitted to the Department of Urban Studies and Planning
in Partial Fulfillment of the Requirements for the Degree
of

Master of City Planning

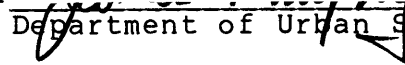
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Abstract

In New York City, as in the nation, blue-collar employment is losing ground to white-collar, factories to offices. Since office jobs are concentrated in Manhattan, there is a growing disparity of employment opportunity between Manhattan and the outer boroughs of New York City. Moreover, this spatial disparity is compounded by an immense skill disparity: office jobs are ill-suited to New York's huge blue-collar labor force. The continuing loss of manufacturing jobs, nonetheless, has caused many to look to office development as the only potential source of new jobs in the outer boroughs. These outer boroughs are thought to be in competition with the suburbs primarily for back office functions that are priced out of the Manhattan office market.

We designed an empirical analysis of the determinants of office location in the suburbs of New York City. Such a study, we thought, could help us judge the ability of the outer boroughs to attract office development. We sought to explain the variations in office rents across towns by cost factors, and by amenity factors. Do rents vary across towns because the costs of office development vary, or because the amenities of the towns vary? We hypothesized that since the supply of office space is fixed in the short run, demand for various amenities would bid up rents in some towns more than others. The results of our analysis were consistent with our hypothesis: amenity factors predicted rents much better than did cost factors. We suggest that long-term rent differentials across towns can best be explained if one assumes a monopolistically competitive office market. We interpret our findings in the context of other important theoretical and empirical research on office location.

What consequence do these findings have for New York City's efforts to stimulate office development in the outer boroughs? The amenity orientation of office location poses dilemmas for the city in that those locations most attractive to developers are also those locations least in need of development. Finally, we argue that only by reducing the fiscal and political balkanization of the region will New York be able to divert office development from Manhattan to the depressed business districts of the outer boroughs.

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I. The Transition and Its Consequences

The office building has come to replace the factory as the symbol of contemporary urban economic development.¹

New York City's economic problems remain severe. From 1950-1980, the city lost 540,000, or one-half, of its manufacturing jobs. Of the 558,000 net job loss from 1970-1977, 227,000 were in manufacturing. By contrast, there was a net gain of 111,000 jobs from 1977-1980, despite a loss of 40,000 manufacturing jobs during this period.² This fledgling recovery, after a catastrophic loss of jobs during the early 1970s, was due almost entirely to growth in business and professional services -- that is, office jobs. Since 1977, the growth of office employment has exceeded the decline in manufacturing employment.

More important than the simple net employment gain is the profound transformation of the New York economy from manufacturing to office employment. One important consequence of this long-term structural change is a growing disparity of employment opportunity between Manhattan and the four outer boroughs of Staten Island, the Bronx, Brooklyn, and Queens. Because Manhattan dominates the service, finance, insurance, and real estate industries in New York City, the partial job recovery from 1977-1980 was limited to Manhattan. Private sector employment rose 6.5 percent during this period in Manhattan, but less than 1.0 percent in the rest of the city. Worse, in the poorest boroughs of Brooklyn and the Bronx, private sector

employment actually declined.³ Since manufacturing jobs are much more evenly distributed throughout the city than are office jobs, the long-term substitution of office for manufacturing employment will tend to worsen the economic disparity between Manhattan and the outer boroughs.

These trends are by no means unique to New York City; rather, the city is but a dramatic manifestation of a national economic transformation. Since World War II, virtually all of the growth in the American economy is due to an increase in white-collar and service workers, and to growth in the tertiary industries of trade, finance, services, transportation, and government. Employment in the tertiary sector grew from 30.4 million to 57.1 million jobs over the period 1950-1975, or from 54 percent to 69 percent of the nation's workforce.⁴

The national transition from manufacturing to service employment has significant consequences for the economy of cities. The centripetal forces that characterize office location contrast favorably -- from the point of view of cities -- with the centrifugal forces that characterize manufacturing. With the flight of manufacturing from cities to suburbs, and from the Northeast to the Southwest, many geographers and city officials believe that office development promises a new economic base for declining center cities. The concentration and employment density of offices is thought to be ideally suited to urban land-use patterns. This is not to say that there has been little

dispersal of offices; suburbanization of offices, like suburbanization in general, has been extensive and is more pronounced in the United States, than in British or Australian cities.⁵ Office migration to the suburbs is especially dramatic in the case of Fortune 500 Corporation headquarters. The number of these firms headquartered in metropolitan areas peaked in 1963 at 71 percent of the total and declined to 63 percent, or 313 firms, by 1975.⁶ Still, even with the dramatic growth of suburban office markets, downtowns in major cities seem to have held their own: between 1960 and 1975, major downtowns acquired 22 percent of the nationwide net addition of office space, meaning that they have retained overall a constant share of 23 percent of total national detached office space.⁷ There is thus some reason to expect that the growth of the tertiary sector will strengthen the economic base of major cities.

It would be misleading, however, simply to survey aggregate employment measures and conclude that, if overall employment is growing due to office development, all is well. As we saw in the case of New York's "recovery" during 1977-1980, the net increase in employment masked important disparities: employment declined, for example, in Brooklyn and the Bronx. A fundamental asymmetry is at work: the loss of one manufacturing job is by no means equivalent to a gain of one office job. As a major manufacturing city, New York was able to provide many

middle-income jobs to unskilled working-class people. Now, as a service economy, the jobs available in New York are either highly-paid jobs for experienced professionals, or poorly-paid jobs for clerical personnel (and are typically held by women). Besides tending to produce a more unequal distribution of income, the service sector does not offer potential employment for the enormous number of blue-collar male workers.⁸ A mismatch of immense proportions is developing because the jobs created are not suited to the skills of the low-income workforce. The consequences of this structural mismatch can only worsen as low-income men enter the labor force without hope of service employment. One window on the employment consequences of this transition to a service economy may be the fact that before 1970, New York's unemployment rate was consistently below the national average, while after 1970, the unemployment rate has consistently exceeded the national average. The 8.6 percent 1980 jobless rate for New York was one-fifth higher than the national average; the teenage unemployment rate in 1980 in New York City was 28.3 percent, while the national average was 17.7 percent.⁹ Some employment statisticians have dubbed New York "the youth unemployment capital of the nation." Another window on the employment consequences of the transition to a service economy is from a study conducted by the City Office of Economic Development on commuting patterns to New York. It was estimated that perhaps 75 percent of the 135,000 office

jobs created since 1977 are held by commuters, chiefly middle-aged women.¹⁰ Although these new service jobs may not be suited to blue-collar New York City residents, they are well-suited to suburban housewives.¹¹ Such trends (if that is what they prove to be) do not bode well either for the employment prospects of working-class New Yorkers, or for reducing regional disparities in income.

II. Back-Office Development: Reality or Mirage?

New York City officials view the transformation of the national economy and its dramatic New York manifestation as given. These officials, along with many economists and geographers, define the issue as: How can New York City benefit most from the growth of the service sector?¹² A recent development in the Manhattan office market poses vexing policy issues for the economy of New York City. The years 1980-1982 were the boom phase of the characteristic boom-bust cycle of office construction.¹³ Five million square feet per year were scheduled for construction in Manhattan from 1980-1985. Demand remained strong through 1982, so that vacancy rates were very low. Consequently, office rents rose dramatically to \$40 per sq. ft and higher in Midtown Manhattan. As rents continue to increase as a proportion of operating costs, it becomes increasingly uneconomic for office support services to pay headquarter prices. These support services, or back-office functions, include computer services and data processing, training

programs, accounting and billing, and check processing. Several banks and insurance companies have found that they can split headquarter functions from back-office functions and then relocate back-office functions to lower-rent areas. Should this become a trend, it is of concern to city officials since most of the low-rent office space in the region is in the suburbs, beyond the tax jurisdiction of New York City. New York City economic development officials hope to capture most of the relocated back-office space in the outer boroughs. Preventing the erosion of the tax base is the city's first concern, but back-office development in the outer boroughs is also desired as the one hope for job growth in the stagnant outer borough economies.

There are some plausible reasons why back-office functions might relocate out of Manhattan. Robert M. Haig argued in 1926 that office activities concentrate in urban business districts "so as to give the greatest possible ease of contact among men whose presence is desired in arriving at decisions."¹⁴ Since then, it has become a commonplace to hold that offices concentrate in order to allow face-to-face contact among executives, lawyers, accountants, clients, and other professionals. The dispersal of offices to the suburbs in the United States and Europe has led some researchers to qualify the importance of face-to-face contact.¹⁵ Research to uncover the actual pattern of office communications confirms the

importance of face-to-face contact, but only for the top decision-making positions in a firm. Routine, or back-office, functions rely almost entirely on telecommunications, and therefore do not require a center-city location. A study of firms that relocated from Central London to its suburbs indicated that such firms have a higher content of clerical and routine functions than do firms that remain in the center city.¹⁶ The type of job is, in general, more important than the type of firm in predicting dispersal.

Despite these plausible reasons to expect back-office space to relocate out of Manhattan, fluctuations in rents often remove incentives to relocate. Long-term efficiency may require that routine office functions that do not require a high-rent central location relocate to a lower-rent peripheral one. But market rents reflect short-run conditions and do not provide consistent incentives for achieving long-run efficiency. Given the boom-bust cycle of the office market, firms will consider relocating back-office functions when vacancies are low and rents high, but when rents fall, the incentive to relocate back-office functions disappears. Since real estate costs are only a small fraction of total expenses, and since there are costs associated with moving, firms are not likely to move support functions unless there is a very substantial rent saving. Short-term rent fluctuations send conflicting signals to firms and may hinder the achievement of long-

term efficiency. This phenomenon is especially evident in the case of energy. Long-term efficiency requires substantial investment in conservation and alternative sources of energy, but energy prices fluctuate and send conflicting signals to firms. The 1982 decline in oil prices brought investment in conservation and alternative sources to a standstill. The analogy to the office market can be extended when one considers the role of government. In the case of energy, a sensible role for government is to tax energy, to maintain a high price and send consistent signals to firms. One could similarly argue that government should tax office space in central business districts to reduce congestion by encouraging the relocation of routine office functions. This would ration scarce downtown sites to those functions that most need a central location.¹⁷

III. The Outer Boroughs Versus the Suburbs

New York City is in an unenviable position. Some degree of dispersal of offices out of Manhattan is both inevitable due to the costs of congestion and desirable due to the need to reduce the disparity of employment opportunity within the city. The question is to what extent this dispersed office space can be captured in the outer boroughs of New York City. The suburbs offer stiff competition to the outer boroughs for low-rent office space. There is a huge prime office space market in place

in many suburban locations, for example, while there have been virtually no major office developments in the four outer boroughs since World War II.

When considering comparative locational advantages, it is misleading to contrast the suburbs with the outer boroughs as if these were homogeneous entities. There is no typical suburban site anymore than there is a typical outer-borough site. The suburbs offer a bewildering diversity of locations, from downtown Stamford, to rural New Jersey, from Newark to Scarsdale. The same is true of the outer boroughs, which include vast expanses in industrial parks, such as Spring Creek in Brooklyn, or dense business districts, such as St. George, Staten Island, or downtown Brooklyn. The issue then becomes not whether a firm prefers the suburbs or the outer boroughs, but instead the specific locational characteristics desired that may be found in the suburbs, in the outer boroughs, or both.

Several city officials, especially at the Public Development Corporation, have argued that in order to compete with the suburbs, the outer boroughs must offer suburban-style sites. To begin with, such a view embodies the misleading notion that there is some typical suburban office site. But even if we provisionally accept the proposition that the typical suburban site is a large, campus-style, low-rise office park at the intersection of two major highways, the implications of such a popular

suburban site are by no means clear. What is it about this site that makes it attractive? Do firms want the view, or the highway? Are the buildings low-rise because the land is cheap, or because low-rise are more convenient? Do firms move to the countryside for the beauty, or for security? The simple fact of the popularity of these office parks does not tell us why they are popular.

The debate about the relative comparative advantages of the suburbs and the outer boroughs relies almost exclusively on speculation and anecdotal evidence. Some hypothesize that firms favor suburban sites because they feature a higher income residential environment. Others offer anecdotes about relocation: this firm moved to Stamford because the chairman lives there; or that firm moved out of Manhattan because the president was robbed. Many of these theories and anecdotes are, no doubt, plausible. The question is whether they can be tested empirically, and what such tests might tell us about the determinants of office location. An empirical analysis may be able to inform the debate about office development in the outer boroughs in three ways: (1) to judge the ability of the outer boroughs, in general, to compete with the suburbs for offices; (2) to judge which specific types of locations within a given borough are most likely to attract development; and (3) to judge what tax abatements, subsidies and other incentives are likely to influence office location. No argument is made that an empirical

analysis can offer any solutions to the vexing policy issues facing New York. The location of offices affects the distribution of employment and income, and these consequences may be more important than the simple development potential of a site. A study of locational determinants may tell us whether a site is attractive to developers, but it can tell us nothing about whether the site should be developed.

IV. An Analysis of the Determinants of Office Location

A. Introduction

Most office buildings are built on speculation by real estate developers who must anticipate the growth in employment and demand for office space. This speculation is often based on a very sketchy analysis of future demand, as evidenced by the chronic oversupplies of office space in many cities.¹⁸ Profits in real estate can be very handsome, and tax laws in the United States encourage equity partnership in real estate development.¹⁹ Office development in New York is extremely cyclical in character. As one observer wrote: "Inadequate information and long lead time for construction distort the relationship between supply and demand, which is uneven and often appears to verge on the irrational."²⁰ The office market, thus, appears to approximate the famous hog-market disequilibrium of economic theory. If the office market is a boom-bust performance, then we would expect vacancy rates to fall

very low during the boom and rise very high during the bust -- which is, in fact, what happens. In Manhattan, the vacancy rate fell to 0.5 percent in 1967-68, but rose to 14.6 percent in 1972.²¹

One reason for this cyclical pattern is the long lag between the conception of a project and its completion. The two to three-year lead time for a project means that the supply of office space cannot immediately respond to changes in demand. Moreover, once an office building is completed, it cannot be quickly converted to an alternative use if demand falls. What do immediately respond to changes in demand are the vacancy rate and the rent. High demand, assuming a fixed supply in the short term, causes vacancy rates to fall and rents to be bid up. Short-term rents, then, will tend to be determined by demand characteristics, since supply is fixed.

We began our analysis by selecting the 47 towns that account for most of the suburban New York office space market and for which office rents by building were available. Since the outer boroughs are thought to be competing with the suburbs, and since the Manhattan office market is not comparable, we restricted our study to the suburban office market. We obtained rents per square foot and the total number of square feet for each of 278 buildings. There is no census of office buildings in suburban New York. Our sample, though, was from the most comprehensive inventory available, an inventory that

included approximately 1800 buildings. From these we calculated a weighted mean rent for each town by dividing the total rents by the total square footage (see Table 5). Since our interest is in new, prime office space, we included only buildings in excess of 40,000 sq. ft. We lacked data on the age of the buildings, so we excluded buildings with rents below 10 dollars per sq. ft on the assumption that rents below this correspond to old, inferior office stock. One would expect, on such an assumption, to find such low rents only in very old office districts such as in Bridgeport, Connecticut, or Newark, New Jersey - which was in fact the case.²²

We sought to explain the variations in rent across towns by a variety of factors relating to cost differentials and to amenity differentials. Since we are assuming that the supply of office space is fixed in the short term, we expect that rents will vary according to the demand for amenities in a particular town. Towns that are more desirable places to work and live should have office rents bid up by the willingness to pay for locational amenities. If supply is indeed fixed in the short term, then we would expect cost factors to have little effect on the variations in rents.

B. The Variables and Some Diagnostics

The cost variables included the following:

- (1) Two measures of the height of buildings in a

given town: The mean number of stories, and the proportion of buildings in a given town with more than eight stories. The taller a building, the more costly it is to construct per square foot, and building above 8 stories is thought to be significantly more costly than building under 8 stories.²³

(2) Electricity costs, given by the average monthly electric bill for firms using approximately 150,000 kilowatt hours (see Table 2). Since virtually all rents included in the sample were gross (include utilities), the cost of electricity should be reflected in the rents.

(3) The distance to Manhattan in miles as a proxy for transportation costs. In classical location theory, as one moves away from the central business district, transport costs to that district increase, so that rents decrease accordingly.

(4) Effective commercial property tax rates, in dollars per hundred assessed valuation. There is no theoretical agreement about the incidence of the commercial property tax. A significantly positive correlation with rents could indicate that the inter-jurisdictional differences in taxes were passed on to the tenants, while the absence of any correlation with rents might mean that the differences in taxes were borne by the landlord.²⁴ Alternatively, a positive correlation between the property tax and rents may mean that towns with significant locational advantages could raise their commercial property

taxes to capture some of the value of those locational advantages.²⁵ Our study is not adequate to contribute to the debate on property tax incidence, and only notes the issues.

(5) Labor costs, no measure. The labor costs of constructing and operating office buildings are no doubt substantial, but there are probably not significant differences in labor costs among suburbs in the New York metropolitan region. The cost of labor probably differs between New York City and its suburbs (see Table 3), but probably not among suburbs.

The amenity variables included the following:

(1) Effective residential property tax rates, in dollars per hundred assessed valuation. We hypothesize that executives choose office locations in places where they either live or would like to. We thus expect a negative correlation with rents, since high residential property taxes are a disamenity.

(2) Commuter rail access to Manhattan, a categorical variable of either yes or no. Rail access to Manhattan is assumed to be an amenity.

(3) Location by state, a categorical variable for New York, Connecticut, and New Jersey. Although many factors may vary by state, we hypothesize that the most important is personal income taxes. Personal income taxes, unlike corporate income taxes, vary widely across our three states. Since state income taxes differ by kind of income

taxed, and not simply in degree, a categorical variable is the best way to attempt to capture this effect. Executives who make locational decisions are assumed to be very concerned with the state personal income tax, and a low tax rate would be a major amenity (see Table 2).

(4) Socio-economic stratification, or "living with the right kind of people." We expect that managers and top corporate officials prefer to live and work near people of a similar class, race, and occupation. So residential amenity is measured by several proxies including the proportion of residents who are black; the percentage change in population from 1970-1980 (to measure "white flight"); the proportion of adults over 25 years old who have completed high school; the median per capita income; the median family income; the proportion of the residents under the poverty level; the number of clerical workers, and their proportion of the workforce; and the number of managers and their proportion of the workforce. A highly desirable location is hypothesized to be one where the residents are predominately white, well-educated, high income, and in managerial occupations.

(5) School quality, as measured by county average educational expenditures per capita. Executives are assumed to regard high quality schools as an amenity. Our measure of school quality, though, is very poor.

The correlation matrix provided important information about both the bivariate relation between

independent and dependent variables, and about relationships among the independent variables (see Table 4). The correlations between the average rent and our independent variables displayed one interesting pattern: the amenity variables were consistently more highly correlated with the average rent than were the cost variables. Although this pattern could disappear in the multiple regressions, it suggests that amenity factors are better predictors for rents than are cost factors. The possibility cannot be excluded, however, that this result derives solely from poor data on cost factors. Perhaps more important are the correlations among the independent variables. Since our variables include several different measures of the same factor, we would expect these to have a high degree of correlation. Median family income and median per capita income, for example, have a correlation of .941; the proportion of residents who are black has a .715 correlation with the proportion below the poverty level. To avoid redundancy, or in statistical parlance, colinearity, we must not use two measures of the same phenomenon. On the basis of these preliminary diagnostics, we chose the most promising variables (see Table 1).

The mean rent for each town was derived from a sample of buildings located in that town, and weighted by the number of square feet. Since the number of square feet differed in each town, we have varying degrees of confidence in the estimated average rents. Larger samples,

ceteris paribus, mean better predictions, so we need to give more weight to towns with a larger number of square feet of office space in our sample of buildings. Given our definition of mean rent, and assuming that rents per sq. ft by building have constant variance, then weighted least squares is the appropriate model-building technique (see Table 5).

C. The Cost Model

Our first task was to predict rents on the basis of cost factors. We assumed that the costs of constructing taller buildings and the costs of electricity (since these are gross rents) would certainly be reflected in the rents. The incidence of commercial property taxes is a more complex issue. If supply is, in fact, fixed in the short run, then we would expect the tax to be borne by the landlord. From this assumption, we would predict no correlation between rents and commercial property taxes. A significantly positive correlation between rents and property taxes could indicate that supply is not completely inelastic in the short run, and taxes are, at least in part, shifted forward to the tenants. Finally, the rent gradient of classical location theory leads us to expect a negative correlation between rents and the distance to Manhattan.

Our first model predicts rents as an additive function of the average stories of buildings, the costs of electricity and the commercial property tax rate.

The estimated coefficients are:

$$\begin{aligned} (1) \text{ rent} &= 16.384 + .459 (\text{average stories}) \\ &\quad (4.580) \quad (2.360) \\ &+ .249(\text{electricity costs}) - 1.641(\text{commercial tax}) \\ &\quad (.782) \quad (-3.395) \end{aligned}$$

(The figures in parentheses under the coefficients are T-ratios)

$$\text{dgf} = 43 \quad r^2 = .259$$

The coefficient for electricity costs is not significantly different from zero at the .05 level. The principal difficulty with this model is the negative coefficient for the commercial property tax. No matter what assumptions are made about incidence, a significantly negative correlation is difficult, if not impossible, to explain. We will argue later that this negative relation can be understood only when we assume that what is really being measured is the residential property tax rate. Another shortcoming of this model is that it only explains about 26 percent of the variations in rents.

Our second model attempts to see if these predictive relations remain constant if we control for distance by adding it to our first model.

The estimated coefficients are:

$$\begin{aligned} (2) \text{ rent} &= 16.739 + .461(\text{average stories}) \\ &\quad (4.517) \quad (2.346) \\ &+ .269(\text{electricity costs}) - 1.697(\text{commercial tax}) \\ &\quad (.828) \quad (-3.359) \\ &- .017 (\text{distance}) \\ &\quad (-.429) \end{aligned}$$

$$\text{dgf} = 42 \quad r^2 = .263$$

Neither distance nor electricity cost coefficients are significant at the .05 level. The coefficient for the commercial property tax remains difficult to interpret as a commercial tax. Since the coefficients for electricity costs and distance are essentially zero, we decided to drop them from the model.

Our third model, then, predicts rents as an additive function of the average stories and the commercial property tax.

The estimated coefficients are:

$$\begin{aligned} (3) \text{ rent} &= 19.007 + .429(\text{average stories}) \\ &\quad (15.410) \quad (2.261) \\ &\quad - 1.405(\text{commercial tax}) \\ &\quad (-3.738) \end{aligned}$$

$$\text{dgf} = 44 \quad r^2 = .249$$

Comparing the r^2 statistic with those of previous models shows that these two variables account for essentially all of the explanatory power of the previous models. Still, even though both of our coefficients are statistically significant, this in no way implies that they are substantively significant. In particular, we are forced to assume that the commercial tax coefficient is measuring something else. Because of these substantial interpretive problems, we thought it useful to omit this commercial tax variable, and fit a model with variables that we could interpret.

Our fourth model predicts rents as an additive function of electricity costs, the average stories and the

distance to Manhattan.

The estimated coefficients are:

$$\begin{aligned} (4) \text{ rent} &= 20.889 - .423(\text{electricity costs}) \\ &\quad (5.358) \quad (-1.510) \\ &\quad + .141(\text{average stories}) + .018(\text{distance}) \\ &\quad (.738) \quad (.403) \end{aligned}$$

$$\text{dgf} = 43 \qquad r^2 = .060$$

Here none of the coefficients is significant at the .05 level, and the explained variations in rents is less than 1 percent. It appears that the explanatory power of the previous models and the significance of the average stories coefficient depended on the commercial property tax. Yet the commercial property tax coefficient is not interpretable and may be measuring the residential property tax. Our cost factors appear to have almost no explanatory power. This result does not prove, but is consistent with our assumption that short-term supply is fixed. The possibility remains that these results are due to poor data or that we are measuring the wrong cost factors.

D. The Amenity Model

Our second task was to predict rents on the basis of amenity factors. With supply fixed in the short run, the variations in rents should stem from shifts in the demand curve due to a willingness to pay for a desirable location. So we would expect that more desirable locations could command higher rents than less desirable locations. What constitutes a desirable location? We assume that

executives, like everyone, prefer short trips to work rather than long ones. So they would like to locate their offices in a town where they live or would like to live. And executives also want their offices to locate in prestigious and fashionable places where, in short, other large firms have located. From these assumptions we would expect a desirable town to have a high socio-economic profile, but also have a fashionable office district. We assume that it requires a certain critical mass of managers to make a town fashionable, so we used the variable for the number of managers. A large clerical workforce might also be thought desirable, though such a clerical workforce would reduce the high-income profile of the town. Finally, executives are assumed to prefer lower residential property taxes to higher.

Our first model predicts rents as an additive function of the residential property tax rate, the number of managers, the number of clerical workers, and the median income per capita.

The estimated coefficients are:

$$\begin{aligned}
 (1) \text{ rent} &= 13.802 - 1.333(\text{residential tax}) \\
 &\quad (12.484) \quad (-4.219) \\
 &\quad + 2.440(\text{managers}) - .263(\text{clerical}) \\
 &\quad \quad (8.073) \quad \quad (-2.673) \\
 &\quad + .258(\text{median income}) \\
 &\quad \quad (2.798)
 \end{aligned}$$

$$\text{dgf} = 42 \qquad r^2 = .844$$

All of our coefficients are significantly different from zero at the .05 level, and the model explains 84 percent of the variations in rents.

Since this model uses the number of managerial and clerical workers instead of their proportions of the workforce, there is a chance that we are in fact just measuring the effects of the size of the town on rents. Our correlation matrix shows high correlations between population size and both managers (.755) and clerical (.971) workers (see Table 4). Because of this danger of colinearity, we decided to control for population size and see if our occupational groups retain any independent explanatory power.

Our second model, then, simply adds the population size to the first model.

The estimated coefficients are:

$$\begin{aligned} (2) \text{ rent} &= 13.802 - 1.333(\text{residential tax}) \\ &\quad (12.331) \quad (-4.164) \\ &\quad + .258(\text{median income}) + .000(\text{population}) \\ &\quad (2.757) \quad (-.008) \\ &\quad + 2.439(\text{managers}) - .261(\text{clerical}) \\ &\quad (7.772) \quad (-1.027) \\ \text{dof} &= 41 \quad r^2 = .844 \end{aligned}$$

It is remarkable just how similar this model is to the previous one -- except that the coefficients for population and the number of clerical workers simultaneously become insignificantly different from zero at the .05 level. The number of clerical workers appears to exert no independent explanatory power apart from the

size of the population. The number of managers, however, appears to retain a significant predictive power even after controlling for population size. It is not, then, simply the size of a town that makes it desirable for offices, but the size of the managerial population. Such a result does not prove, but is consistent with, the theory that firms desire fashionable locations.

Our third model summarizes these findings, and predicts rents as an additive function of the residential property tax rate, the median income per capita, the population, and the number of managers.

$$\begin{aligned}
 (3) \text{ rent} &= 13.695 - 1.406(\text{residential tax}) \\
 &\quad (12.280) \quad (-4.503) \\
 &\quad + .289(\text{median income}) - .018(\text{population}) \\
 &\quad \quad (3.272) \quad \quad (-2.431) \\
 &\quad + 2.267(\text{managers}) \\
 &\quad \quad (8.537)
 \end{aligned}$$

$$\text{dgf} = 42 \qquad r^2 = .840$$

These coefficients can be interpreted as a willingness to pay for certain amenities. Other things equal, firms are willing to pay in rent per square foot: 1.41 dollars for every one dollar reduction in the residential property tax rate, 29 cents for every 1000 dollar increase in the median income, 2 cents for every 1000 reduction in population, and 2.27 dollars for every 1000 increase in managers.

The negative relationship of population to rents poses an interpretive question. Why should an increase in

population reduce rents? To begin with, the bivariate correlation of rent and population is slightly positive (.120). But this positive correlation seems to be measuring the positive relation between rents and the number of managers. So a larger population does mean higher rents insofar as a larger population indicates more managers. But once we control for the number of managers, the relation between population and rents turns negative and is significant at the .05 level. This makes sense when we consider that the larger cities in metropolitan New York tend to be older, declining industrial cities with a large proportion of poor, black residents. We immediately think of the large cities in our sample, such as Newark, New Brunswick, Elizabeth, and Bridgeport. The correlation matrix confirms our intuition: population has a $-.409$ correlation with median income, and at $.440$ correlation with the proportion of blacks. Given that population is positively correlated with all of these -- from the perspective of managers -- disamenities, it is not surprising that population is negatively related to rents.

Although corporate income taxes do not vary significantly by state, personal income taxes vary widely (see Table 2). This suggests that while costs do not vary by state, amenities for executives do. In an attempt to test for these personal income tax differentials, we decided to include a categorical variable for location by state.

Our fourth model simply added the state categorical variables to the third model.

The estimated coefficients are:

$$\begin{aligned}(4) \text{ rent} = & 13.740 - 1.024(\text{residential tax}) \\ & (9.141) \quad (-2.339) \\ & + .296(\text{median income}) - .016(\text{population}) \\ & (3.572) \quad (-2.088) \\ & + 1.822(\text{managers}) + 1.830(\text{Connecticut}) \\ & (6.006) \quad (3.055) \\ & - .722(\text{New Jersey}) - 1.108(\text{New York}) \\ & (-1.616) \quad (-5.472)\end{aligned}$$

$$\text{dgf} = 40 \qquad r^2 = .873$$

Although categorical variables do not tell us why a category has predictive power, the coefficients of these state categories are quite consistent with our theory of the importance of personal income taxes on location amenity. Connecticut has a strong positive effect on rents, and is the only state of the three that does not tax earned income; New York levies the most progressive income tax and has the most negative effect on rents; and New Jersey's coefficient is between the other two, as is its income tax. Moreover, a general F-test between the two hierarchically related models 3 and 4, yields an F-ratio of 5.0925 which is significant at the .05 level. The state effects, thus, are statistically significant as well as substantively significant.

V. The Amenity Orientation of Office Location

Amenity factors appear to predict rents much more

powerfully than do cost factors. We will argue that there are a number of good reasons for this to be so. Beginning with the most specific considerations, we will move to more general explanations of why amenity factors should be the best predictors.

A. Specifics of the Cost Model

The negative coefficient attached to the commercial property tax rate posed significant interpretive problems. No matter how we view the question of incidence, this negative relation is difficult to explain. The correlation matrix shows a .865 correlation between commercial and residential property tax rates. This fact, combined with the straightforward interpretation of the negative residential property tax coefficient, leads us to believe that what the commercial property tax variable is measuring, if anything, is the residential property tax. As a final test of colinearity, we added the commercial property tax rate to our fourth amenity model. The coefficients for both property tax rates became insignificant at the .05 level. This convinced us that colinearity was the problem.

The insignificance of our distance coefficient is consistent with other recent theoretical and empirical research on the rent gradient. In classical location theory, rents diminish as distance from the central business district grows. The decline in rents is thought to compensate for the increased travel costs to the center

city. A weakness of this model has always been its rather heroic assumptions: (1) There is a flat undifferentiated transport surface making travel equally costly in any direction; (2) all production and distribution in a metropolitan area take place in the central business district; and (3) the costs of construction and maintenance must be uniform throughout the region. Although no metropolitan area has ever approximated these assumptions, recent developments in the intra-metropolitan distribution of economic activity especially weaken the plausibility of the gravity model. Suburbanization has caused metropolitan areas to become increasingly multinuclear, weakening the attraction exerted by the core city. Empirical studies of urban land-value gradients over time show that the gravity model is losing predictive power.

As a result of the dispersion of business activity and the growth of other centers, distance from the central business district is gradually losing its once commanding power to explain intra-metropolitan variation in site value.²⁶

The dispersal of economic activity throughout metropolitan New York lessens the need and thus the cost of travel to New York City. All of which tends to flatten the rent gradient, which may help explain the insignificance of our distance coefficient.

B. Amenities and Monopolistic Competition

We have assumed that in the short run, supply is fixed, while demand shifts according to the desirability of a location. Implicit is the view that the supply, office

space, is a homogeneous product distinct from the amenities of its location. Yet it is plausible to think of office space not as homogeneous, but as differentiated according to the amenities of its location. Many commodities are differentiated by reputation, quality, or fashion. Just as a suit from Brooks Brothers is not the same commodity as a suit from Macy's, so an office in Greenwich is not the same commodity as an office in Jersey City. Supply in monopolistic competition cannot simply be measured in physical quantities, since the product supplied has diverse qualities.

In the short run, the supply of office stock is fixed under monopolistic competition, as it is in our model. But if the office-space market is characterized by monopolistic competition, this has long-term consequences for rent differentials across towns. If we assume that office space is a homogeneous product, then with supply fixed in the short-run, demand can bid up rents. In the long run, however, supply should increase to meet demand, and rents should fall to an equilibrium level. Yet, we observe long-run rent differentials between, for example, Greenwich and Jersey City. Why does supply not increase over time in Greenwich to lower rents to the level of Jersey City? The reason is that for monopolistic competition, in addition to short-term fixity in supply, there is a long-term fixity. Product differentiation gives the seller control over a scarce resource -- the prestige

of the product. Insofar as people are willing to pay more for the prestigious location, then the seller can for a long time command a higher rent. Prestige and reputation are scarce resources, and their owners can earn long-term profits from them. If Brooks Brothers can convince people that their suits are unique, then increasing the supply of other-make suits will not necessarily lower the price of a Brooks Brothers suit. Prestigious office locations in Greenwich are scarce resources, and their owners can command higher rents in the long term because they provide a different product. Eventually, it is true, fashions change, new prestigious locations emerge. Market power to raise prices diminishes.

Our model examines only short-term rent determination and cannot prove or disprove the hypothesis of a monopolistically competitive office market. Yet, since amenities are the basis of product differentiation, our amenity-oriented model is at least consistent with the theory of monopolistic competition.

C. Amenities and Office Location Theory

Cost models of firm location were developed by geographers such as Weber (1909), Losch (1954), and Isard (1956), primarily to explain industrial location. Manufacturing firms are thought to choose an optimal location with respect to markets on the one hand and factors of production on the other. Because shipping raw materials to the plant and processed commodities from the

plant is expensive, location is thought to be fairly sensitive to costs. Yet these cost-oriented models do not make as much sense in the case of offices, since it is difficult to measure the locational costs of office functions such as decision-making. Malamud argues that "office location is perceived to be less sensitive to costs than are most economic activities."²⁷

Since the costs of any location are often small and intangible, locational decisions are typically made by tradition and fashion.

There is no process of accounting that can weigh the enhancement in quality of executive decision-making in a given location against the costs of operating at that location.²⁸

In addition, the greater mobility of offices in comparison with manufacturing plants means that the costs are smaller of choosing a poor location.

Surveys of executives who make locational decisions are another window on the determinants of office location. Since little quantitative evidence is available on the costs and benefits of alternative sites, "executives must base location decisions on vague and personal ideas rather than on hard financial data".²⁹ The very uncertainty about the costs of alternative sites may contribute to the trendiness or "swarming," as executives feel that they are minimizing the risks of choosing a poor location by staying with the crowd.³⁰ Many surveys reveal that proximity to executive residences is often a key

influence on location in Sydney, London, and New York.³¹ International surveys also reveal that push factors influence decisions to move to the suburbs. These urban disamenities include congestion, lack of room for expansion, and high rents. In a survey of major English-speaking nations, only American executives mentioned a poor overall urban environment as a factor in relocation decisions. This probably reflects the relative quality of urban life in American, British, and Australian cities.³²

There have been no good studies of the influence of prestige on location decisions, even though real estate agents place a great deal of emphasis on prestige.³³ Surveys of executives find prestige mentioned frequently with respect to relocation.³⁴ The tendency for offices to swarm to a fashionable location may be reinforced by financial institutions. Banks may favor conventional, prestigious sites when considering loans to developers.³⁵

D. Offices and Household Location Theory

Despite widespread recognition that personal preference rather than cost calculation characterizes office-location decisions, the equilibrium-cost models of industrial location theory remain highly influential. Some researchers like Malamud endeavor to create neoclassical equilibrium models for office location in which communication costs are analogous to transportation costs in the industrial location model. Yet the pervasive evidence of the importance of subjective factors,

prejudice, and ignorance of alternatives in office-location decisions throws considerable doubt on the possibility of developing an office-location model within the context of industrial location theory.³⁶

Given the centrality of personal preference in office location, household location theory should offer a more satisfactory theoretical context than industrial location theory for understanding office location. Traditional household location theory assumed that upper income households moved to the suburbs because they preferred the benefit of extra land more than the costs of extra commuting.³⁷ But recent research by Wheaton indicates that extra land is actually valued less than the costs of commuting. He concluded that the demand for land does not explain migration to the suburbs; instead, he suggested that people are drawn to the suburbs by lower taxes and amenities, such as school quality.³⁸ Tiebout was the first to argue that households examine local fiscal advantages when choosing residential location. Oates then tested Tiebout's hypothesis by assuming that net fiscal residuals (i.e., the difference between taxes paid and services received) attract households, raising the demand for housing and land and bidding up their prices. Oates found evidence that property values are positively correlated with local expenditure and negatively correlated with the local tax rate.³⁹ Oates model of household location is quite similar to our model of office location.

Where he found residential property taxes negatively correlated with property value, we found the same negative correlation between residential property taxes and office rents. Reschovsky also found residential property taxes negatively correlated with household location.⁴⁰ What is significant for our purposes is the consistency of these theories and findings with our amenity model of office location. The causal link between household location models and our office location model is the preferences of executives. Not surprisingly, corporate officials prefer to locate offices in places where they reside or would like to reside.

VI. Public Policy and Office Location

A. A Role for Government?

Before we turn to some of the public policy implications of our findings, we should examine the issue: why should government intervene in office location, why not let the market function freely? We believe that government intervention can be justified on the basis of externalities. There is reason to believe that although the costs to firms may not differ much across locations, the costs to society differ considerably. Government has a legitimate role in reducing the divergence between the private costs and the social costs for many office locations. Campus-style suburban office sites are a good example. Built along major highways, these office parks

have become very popular locations. Typically, state and local governments assume the costs of sewers, utilities, and highway expansion to accomodate these sites. Offices are major traffic generators, and the cost of increased highway capacity is enormous -- and is borne by the public. By contrast, location in a regional subcenter, such as Newark, Stamford, and Bridgeport, creates fewer external costs since the infrastructure is already in place. A private firm, however, has no incentive to choose the regional subcenter since the costs associated with the campus site are not borne by the firm.

The Regional Plan Association conducted a survey of office employees to estimate the relative magnitude of the transportation costs among office locations in Manhattan, regional subcenters, and suburban campus sites. For firms moving from Manhattan to a campus site, travel time to work is reduced, but total travel time (including lunch trips, etc.) remains constant. The reduction in travel time to work is most pronounced for executives -- which throws light on why offices move to the suburbs. The reduced travel time to work, however, is achieved at the cost of much greater energy use: "The transportation energy use per employee at campus sites is virtually double that of Manhattan locations."⁴¹ Differences in the mode of transport explain the disparity in energy use: campus sites rely on auto use, while Manhattan relies on transit. At regional subcenters, the energy use per employee is

halfway between the Manhattan low and the campus high. Such dramatic contrasts in energy use suggest some of the social costs incurred by different office locations. To encourage energy conservation, government has a sound economic justification for regulating office location.

B. The Dilemmas of Office Development

We can now turn to the question: what do our findings tell us about New York City's efforts to stimulate office development in the outer boroughs?

Our model indicated that in the short run, due to the assumed fixity in supply, costs had little bearing on the determination of rents. About the long-run importance of costs, our model tells us nothing directly. Nonetheless, many geographers have concluded that even in the long run, office location is not very sensitive to costs and seems to be fashion and amenity oriented. And if the office market is monopolistically competitive, then costs would have a secondary role in determining even long-run rents. All of this casts doubt on the efficacy of tax abatements, subsidies, and other incentives for stimulating office development in the outer boroughs. Commercial property taxes are higher in Westchester County, for example, than in the outer boroughs of New York City, yet office developers far prefer Westchester.⁴²

The amenity orientation of office location has, in general, grave implications for the outer boroughs. While there are enormous differences among and within boroughs,

overall, the outer boroughs have a much less desirable socioeconomic profile -- from the perspective of corporate executives -- than does, say, Fairfield County. Residential property taxes in the outer boroughs are lower than in suburban New York State, though higher than Fairfield County.⁴³ It is not clear, however, what can be done about this. With the preponderance of apartments in New York City, lowering residential property taxes would benefit landlords, but not necessarily tenants.

Quite simply, the poverty, blight and crime of many parts of the outer boroughs -- especially the Bronx and Brooklyn -- are a formidable obstacle to office development. Moreover, state and local governments lack the resources required to create a decent environment in New York City; the federal government, meanwhile, cannot afford both the military budget and the reconstruction of our cities. The outer boroughs would appear to have more promise if costs were the key determinant of office location, for New York City is in a much better position to reduce development costs than to make the outer boroughs attractive places to live and work.

Our findings pose a number of dilemmas for office development in the outer boroughs.

First, if executives will tend to prefer the amenities of the suburbs, then back-office development may offer the most promise for the outer boroughs, since routine functions involve few executives. Unfortunately,

back-office functions are the most rapidly replaced by new technologies, and thus offer little potential employment growth. So the very office functions the boroughs are most likely to obtain, are the office functions that are least likely to enhance employment opportunity and stimulate local borough economies.⁴⁴ The Swedish government explicitly decided in the 1960s not to relocate back-office jobs to depressed regions precisely because it was thought that these jobs would be replaced by automation. Instead, the Swedes chose to relocate headquarter functions to those regions.⁴⁵

Second, if amenities are in fact crucial, then some boroughs have more promise than other boroughs, and some locations in a given borough more promise than other locations. Staten Island and Queens have a higher median income and a lower unemployment rate than Brooklyn and the Bronx. Because of this amenity comparative advantage, Queens and Staten Island may hold more potential for office location than Brooklyn or the Bronx. Yet it is Brooklyn and the Bronx that most need new jobs, and appear least likely to get them. Similarly, within boroughs there are a variety of potential locations for office development. In the Bronx, the Fordham Road business district has excellent transit links to the rest of the city; Baychester Commons, designated as an office park, in the northern Bronx has very poor transit access. If a firm desires to isolate itself from the physical and social disamenities of a

borough downtown, the firm may prefer an office park. The city is, in fact, marketing these office parks for development. Of course, precisely because the office parks are isolated from the disamenities of borough downtowns and lack transit facilities, they are all but inaccessible to lower-income borough residents. A key characteristic of lower-income New Yorkers is that they do not own cars, and jobs created in office parks would almost certainly go to suburban commuters.

All of this suggests that market locational determinants, such as executive preferences, will not necessarily reduce employment disparities between Manhattan and the outer boroughs, or provide jobs for poor New Yorkers. Office development in borough downtowns is preferable to location in office parks for two reasons: first, because downtown jobs are more accessible to low-income people; and second, because the external costs borne by the city of development in office parks -- where infrastructure must be provided -- could be substantial. The fact that the city has good reasons to regulate office location, however, by no means implies that it will. With so many alternative locations available to developers in other jurisdictions, the city fears that any attempt to regulate office location will only lose offices to the suburbs. If it is to reduce the growing disparities of employment and income within New York City, the city must be able to exercise land-use controls to divert office

development from Manhattan to distressed parts of the outer boroughs. Yet the exercise of those controls -- and here is the dilemma -- might only chase offices to the suburbs.

C. What Is To Be Done?

The task of public policy must be to extricate New York from the vexing dilemmas posed by office development in the outer boroughs. As we saw, efforts to simply attract offices to the outer boroughs hold little promise for genuine economic development. The office jobs attracted, if any, will be low-growth back-office jobs; and the sites most attractive to developers are least in need of development. How satisfactory is economic development in the outer boroughs that is not likely to provide jobs for the unemployed residents of those boroughs? Yet the ability of New York City to use land-use controls and taxes to divert office growth from Manhattan to the distressed downtowns of the outer boroughs is undermined by the myriad political boundaries. The New York metropolitan economy spans over portions of three states and includes more than a dozen suburban counties. Each state levies different income taxes; every town levies different property taxes. Firms that need access to Manhattan can locate outside of New York City, or even outside of New York State, and incur lower taxes and cheaper land.⁴⁶ So no matter how overbuilt and congested Manhattan becomes (east Midtown is in near-permanent gridlock), no matter how unevenly distributed office employment becomes (83 percent of total New York

City office space is in Manhattan⁴⁷), the city cannot regulate office location without fearing the erosion of its tax base.

What reason is there to believe, however, that fewer fiscal jurisdictions would enable the City to divert office growth to the outer boroughs? Although controlled experiments are not possible in the social sciences (nor in meteorology or astronomy, for that matter), the experience of London approximates such a control. As in New York, office space expanded enormously in central London with its concomitant crowding and congestion. The Greater London Council, however, has jurisdiction over all metropolitan London: the suburbanization of offices, then, does not erode the tax base. Controls were introduced in 1964 to limit new office construction in central London. Between 1964 and 1977 an estimated 170,000 to 250,000 office jobs were dispersed from the center city to the suburbs, owing, at least in part, to the imposition of controls.⁴⁸ Regional government and a unified tax jurisdiction would enable New York to regulate office location without fear of eroding its tax base. While a Greater New York City Council is not imminent, the federal government, through revenue sharing and grants-in-aid, can help reduce the fiscal disparities that encourage the suburbanization of households and offices. Only a reduction in the political balkanization of metropolitan New York will make office development possible in the distressed business districts

of the outer boroughs.

TABLE 1: Data Matrix for Selected Variables

#	Town Name	1981 Mean Rent (per sq.ft)	1980 Pop. (in thou- sands)	1980 Median Income (in thousands)
1.	Bridgeport	\$16.168	142.546	\$ 6.081
2.	Danbury	18.045	60.470	7.957
3.	Darien	20.500	18.892	18.153
4.	Westport	22.415	25.290	16.925
5.	Greenwich	26.612	59.578	16.602
6.	Stamford	27.331	102.453	10.719
7.	New Haven	15.963	126.109	5.822
8.	Englewood Cliffs	17.462	5.698	14.535
9.	Fort Lee	19.078	32.449	13.295
10.	Hackensack	17.689	36.039	9.462
11.	Montvale	15.863	7.318	10.814
12.	Paramus	15.385	26.474	9.692
13.	Rutherford	16.000	19.068	9.199
14.	West Caldwell	12.500	11.407	10.792
15.	Roseland	14.871	5.330	11.681
16.	Newark	14.511	329.248	4.525
17.	West Orange	15.202	39.510	10.837
18.	Jersey City	14.146	223.532	5.812
19.	Secaucus	15.000	13.719	9.495
20.	Lawrenceville	10.000	2.109	12.479
21.	Princeton	14.810	12.035	9.502
22.	New Brunswick	12.591	41.442	5.782
23.	Piscataway	14.090	45.555	7.143
24.	Woodbridge	16.987	13.762	10.483
25.	Freehold	10.000	10.020	6.957
26.	Red Bank	11.222	12.031	8.344
27.	Florham Park	14.357	9.359	9.528
28.	Morristown	15.792	16.614	9.254
29.	Parsippany	14.596	5.305	10.492
30.	Toms River	13.000	7.465	4.900
31.	Bridgewater	16.595	11.983	10.693
32.	Franklin Twp.	14.752	9.710	9.000
33.	Elizabeth	14.730	106.201	6.712
34.	Springfield	14.000	7.118	11.571
35.	Union	12.064	55.593	5.625
36.	Garden City	15.241	22.927	13.602
37.	Great Neck	14.288	9.168	13.209
38.	Lake Success	18.459	2.396	22.495
39.	Hempstead	10.500	40.404	7.236
40.	Hauppauge	11.839	20.960	8.149
41.	Melville	13.897	8.139	9.843
42.	Elmsford	10.631	3.361	9.603
43.	Rye	19.500	15.083	14.756
44.	New Rochelle	22.000	70.794	10.343
45.	Scarsdale	14.961	17.650	22.956
46.	White Plains	17.153	46.999	10.876
47.	Tarrytown	15.890	10.648	10.778

TABLE 1(cont.)

#	Town Name	Mean Stories	Commer- cial Prop. Tax	Resi- dential Prop. Tax	# of Mgrs.
1.	Bridgeport	11.000	\$2.86	\$2.06	3216
2.	Danbury	3.833	1.15	1.58	1564
3.	Darien	3.000	1.36	1.11	1994
4.	Westport	3.000	2.29	1.39	2551
5.	Greenwich	3.100	0.85	.95	4621
6.	Stamford	5.852	1.71	1.60	5513
7.	New Haven	10.333	3.95	3.81	3104
8.	Englewood Cliffs	2.667	1.47	1.05	586
9.	Fort Lee	6.636	1.82	1.69	2501
10.	Hackensack	6.000	2.85	2.64	1465
11.	Montvale	1.750	1.71	1.69	421
12.	Paramus	3.571	2.13	1.62	1560
13.	Rutherford	12.000	3.18	2.24	915
14.	West Caldwell	2.000	2.86	2.52	707
15.	Roseland	3.714	4.40	3.12	237
16.	Newark	16.788	6.46	3.56	4647
17.	West Orange	3.500	3.50	3.07	2117
18.	Jersey City	12.500	6.88	4.25	4948
19.	Secaucus	4.667	3.88	1.70	372
20.	Lawrenceville	2.000	3.12	1.86	69
21.	Princeton	2.688	2.17	1.73	405
22.	New Brunswick	6.500	4.67	2.59	840
23.	Piscataway	2.600	2.96	1.99	1310
24.	Woodbridge	5.111	3.23	1.81	708
25.	Freehold	5.000	2.28	2.09	337
26.	Red Bank	3.500	3.71	2.72	473
27.	Florham Park	2.400	2.73	1.46	446
28.	Morristown	5.286	2.90	2.48	624
29.	Parsippany	3.000	2.50	1.85	246
30.	Toms River	3.000	2.25	1.91	279
31.	Bridgewater	3.500	3.60	1.79	505
32.	Franklin Twp.	3.500	2.74	2.18	255
33.	Elizabeth	6.000	4.00	3.00	2548
34.	Springfield	3.000	3.43	1.83	616
35.	Union	2.667	1.53	1.80	1187
36.	Garden City	4.333	6.65	3.34	2049
37.	Great Neck	3.545	5.50	3.63	717
38.	Lake Success	3.000	5.04	3.28	290
39.	Hempstead	7.000	6.36	3.70	1322
40.	Hauppauge	3.333	4.16	3.83	480
41.	Melville	3.538	4.30	3.32	320
42.	Elmsford	4.000	5.78	3.77	172
43.	Rye	2.000	5.20	3.04	1263
44.	New Rochelle	17.000	8.30	3.50	4294
45.	Scarsdale	4.333	6.80	4.44	2026
46.	White Plains	6.882	4.60	2.54	3165
47.	Tarrytown	6.000	5.50	3.51	501

Table 1(cont.)

*Sources: Mean Rent - Black's Guide 1982
Stories - Black's Guide 1982
Comm. Tax - Center for Local Tax Research
Res. Tax - Center for Local Tax Research
Income - U.S. Bureau of the Census 1983
Population - U.S. Bureau of the Census 1983
Managers - U.S. Bureau of the Census 1972

Table 2a: 1982 Utility Cost Differentials
in the Region*

<u>STATE</u>	<u>UTILITY</u>	<u>KWHR</u>		
		<u>1,500</u>	<u>10,000</u>	<u>150,000</u>
N.Y.	Con Edison	\$ 299	\$1,402	\$19,540
	LILCO	170	1,091	14,527
N.J.	Jersey Central	171	864	12,274
	Power & Light PSE&G	183	930	12,254
CONN.	United Illuminating	208	1,111	14,962
	Conn. Light & Power	193	978	11,256
	Hartford Electric Light	192	976	11,227

*Source: Edison Electric Institute

TABLE 2b: 1981 Income Tax Differentials in the Region*

(1) Corporate Income:	<u>State</u>	<u>Flat Rate</u>	<u>Federally Deductible?</u>
	New York	10%	No
	New Jersey	9%	No
	Connecticut	10%	No
(2) Personal Income:			
	New York: 2% up to \$1,000 and 14% above \$23,000		
	New Jersey: 2% up to \$20,000 and 2.5% above 20,000		
	Connecticut: 7% on capital gains. 1-9% on dividends above \$20,000		

*Source: The Tax Foundation, Inc.

TABLE 3: 1980 Office Building Operating Expenditures*

1. The components of office operating expenditures:

Energy	22%
Cleaning	15%
Real Estate	22%
General Building Costs	10%
Administrative Costs	6%
Other	25%

2. Downtown New York and other major downtown sites (for 1980, in cents per sq.ft):

<u>City</u>	<u>Total Expense</u>
New York	985.6
Chicago	760.3
Tulsa	543.2
San Francisco	533.9
Houston	506.0
Washington, D.C.	491.6
Atlanta	423.1

3. Differentials in operating expenses in cities vs. suburbs for selected regions (for 1980, in cents per sq. ft):

<u>Region</u>	<u>City</u>	<u>Suburbs</u>
Middle Atlantic	833.4	605.3
Northern Midwest	502	516
Southern	443	406
Southwest	481	487

*Source: Building Owners and Managers Association

TABLE 5: Derivation of Dependent Variable and Its Variance

Derivation of weighted mean rent:

Let r_{ij} = rent/sq.ft in building j , town i .
 Assume r_{ij} has a constant variance: (σ^2)
 Now, mean rent in town i , is given by:

$$\bar{r}_i = \frac{\sum_{j=1}^{n_i} r_{ij} s_{ij}}{\sum_{j=1}^{n_i} s_{ij}} = \frac{\text{total rent in } i}{\text{total sq.ft. in } i}$$

where s_{ij} is the sq.ft for building j in town i
 n_i = number of buildings in town i .

Derivation of variance of mean rents:

$$\text{Then, variance } (\bar{r}_i) = \frac{\sum_{j=1}^{n_i} s_{ij}^2 \text{var}(r_{ij})}{\left[\sum_{j=1}^{n_i} s_{ij} \right]^2}$$

$$= (\sigma^2) \frac{\sum_{j=1}^{n_i} s_{ij}^2}{\left[\sum_{j=1}^{n_i} s_{ij} \right]^2}$$

Therefore, weighted least squares is the appropriate technique. Assuming rents have a constant variance across towns, observed mean rents will be heteroskedastic, as demonstrated in the derivation above.

Notes

1. P.W. Daniels, Office Location: An Urban and Regional Study (London: Bell, 1975), p. 1.
2. Samuel M. Ehrenhalt, "Some Perspectives on the New York City Economy in a Time of Change," in New York City's Changing Economic Base ed. Benjamin J. Klebaner (New York: Pica Press, 1981), p. 13.
3. Ibid., p. 18.
4. Regina B. Armstrong, "National Trends in Office Construction, Employment and Headquarter Location in U.S. Metropolitan Areas" in Spatial Patterns of Office Growth and Location, ed. P.W. Daniels (New York: John Wiley and Sons, 1979), p. 64.
5. Ian Alexander, Office Location and Public Policy (New York: Longman, Inc., 1979), p. 40.
6. Armstrong, "National Trends in Office Construction, Employment and Headquarter Location in U.S. Metropolitan Areas," p. 86.
7. Ibid., p. 88.
8. Thomas M. Stanback, Jr., "New York City and the Services Transformation" in New York City's Changing Economic Base ed. Benjamin J. Klebaner (New York: Pica Press, 1981), p. 53.
9. Ehrenhalt, "Some Perspectives on the New York City Economy in a Time of Change," p. 15.
10. Elizabeth Dickson, "Changing Commuting Patterns to New York City," New York City Office of Economic Development, 1982.
11. Gail G. Schwartz, "The Office Pattern in New York City, 1960-1975," in Spatial Patterns of Office Growth and Location, ed. P.W. Daniels (New York: John Wiley and Sons, 1979), p. 229.
12. See, for example, Regina B. Armstrong, The Office Industry: Patterns of Growth and Location (Cambridge, MA: The MIT Press, 1972), p. 2.
13. Schwartz, "The Office Pattern in New York City, 1960-1975," pp. 224-227.
14. Cited in Alexander, Office Location and Public Policy, p. 8.

15. P.W. Daniels, "Perspectives on Office Location Research," in Spatial Patterns of Office Growth and Location ed. P.W. Daniels (New York: John Wiley and Sons, 1979), p. 23; and Alexander, Office Location Public Policy, p. 25.
16. Alexander, Office Location and Public Policy, p. 54.
17. Such a tax was imposed in Paris, see Alexander, pp. 76-78.
18. Ibid., p. 50.
19. Schwartz, "The Office Pattern in New York City, 1960-1975," p. 226.
20. Ibid., p. 215.
21. Ibid., p. 221.
22. See "Black's Guide 82: Suburban Manhattan Office Space Market," published by James F. Black, Jr., Red Bank, New Jersey, 1982.
23. According to William C. Wheaton, this is a rule of thumb among office developers.
24. William C. Wheaton, "The Incidence of Inter-Jurisdictional Differences in Commercial Property Taxes" (December 1981), p. 3.
25. James Heilbrun, Urban Economics and Public Policy (New York: St. Martin's Press, 1981), p. 461.
26. Ibid., p. 148.
27. Cited in Daniels, "Perspectives on Office Location Research," p. 4.
28. Ibid., p. 4.
29. Alexander, Office Location and Public Policy, p 18.
30. Ibid., p. 52.
31. Ibid., p. 52.
32. Ibid., p. 48.
33. Daniels, "Perspectives on Office Location Research," p. 14.
34. Alexander, Office Location and Public Policy, p. 50.

35. Daniels, "Perspectives on Office Location Research," p. 15.
36. Ibid., p. 4.
37. Michael Wasylenko, "Impacts of the New Federalism on the Intra-Metropolitan Location of Households and Firms: A Review of the Evidence on Intra-Metropolitan Location" (paper prepared for presentation at TRED Conferences, 1982), p. 23.
38. W.C. Wheaton, "Income and Urban Residence: An Analysis of Consumer Demand for Location," American Economic Review 67(1977), pp. 620-631.
39. W.E. Oates, "The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis," Journal of Political Economy 77 (1969), pp. 957-970.
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41. Boris Pushkarev and Robert Cumella, "Travel Requirements of Alternative Office Building Settings," Technical Report No. 2, Regional Plan Association, 1983.
42. Center for Local Tax Research, "Effective Real Property Tax Rates in the Metropolitan Area of New York," 1981, pp. 9-12.
43. Ibid., pp. 9-12.
44. Daniels, "Perspectives on Office Location Research," p. 16.
45. Alexander, Office Location and Public Policy, p. 78.
46. Schwartz, "The Office Pattern in New York City, 1960-1975," p. 216.
47. Ibid., p. 218.
48. Alexander, Office Location and Public Policy, p. 65.

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